Texas Department of Transportation

March 2005

Loop 1 HOT Lanes - Enforcement and Operations
Austin, Texas

FHWA Value Pricing Program
Detailed Proposal

Submitted by: Texas Department of Transportation – Austin District
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Introduction

The Loop 1 Corridor in Austin, Texas is one of the two primary north-south highway facilities in the region and is heavily congested in both directions during peak periods. The central portion of the corridor runs through established neighborhoods, with three lanes in each direction flanking a set of Union Pacific freight railroad tracks (UPRR) in the median. The opportunities for short term congestion relief are limited given the constraints.

TxDOT is proposing a reconstruction project that involves limited right-of-way expansion to add one HOT lane in each direction and construct noise. It is anticipated that the HOT lanes will provide travel options and congestion relief for at least ten years until a larger expansion is completed.

Although the near term reconstruction will offer travel lanes at design standards, there are still numerous constraints geometrically and operationally that will impact lane separation, enforcement, signing, and access locations. Enforcement in particular will be exceptionally challenging since there will be no physical barrier, limited inside shoulder, and no enforcement areas for significant portions of the project.

This value pricing proposal, which involves developing an operations and enforcement strategy for a stripe-separated HOT lane within a constrained cross section, has been developed in accordance with the application guidelines for the Value Pricing Pilot Program authorized by Section 1216 (a) of the Transportation Equity Act for the 21st Century (TEA-21) in the Federal Register Document from May 7, 2001, Volume 66, Number 88, Page 23077 - 23081. Included in this proposal are estimated expenses for each of the anticipated tasks. Note that these are cost estimates and may need to be refined. This plan outlines pre-project activities necessary prior to project implementation. It is anticipated that an implementation project would commence after the completion of this study and upon conclusion of engineering and environmental review processes for the project.

Detailed Proposal

1. Congestion Problem to be Addressed

The Austin Metropolitan Area has experienced explosive population growth over the last ten years. Traffic congestion is increasing and trip reliability is being negatively impacted. Austin has consistently been rated as the most congested U.S. city for its size according to the Texas Transportation Institute's annual Urban Mobility Study.

Loop 1, also known as the Mopac Expressway, is one of two major existing north-south controlled-access freeways in the Austin area. The corridor extends from State Highway (SH) 45 in southern Travis county to Farm-to-Market (FM) 734 (Parmer Lane) in northern Travis County. The expressway serves commuters from both the north and south areas of Austin accessing downtown, the State Capitol Complex and the University of Texas. Traffic growth, measured by average daily traffic has grown 200 percent since 1980. Loop 1 operates at LOS E to F in both directions during peak periods.

2. Proposed Program Description

In January 2004 TxDOT responded to a request by the Downtown Austin Alliance (DAA) to meet with a convened task force charged with examining ways to better move transit into central Austin. Specifically, the charge of this effort was to examine ways that dedicated HOV or bus lanes could be implemented quickly. The portion of the corridor studied in most detail was Loop 1 between downtown and US 183, and US 183 west of the Loop 1 interchange. A separate, earlier regional study performed by Texas Transportation Institute for TxDOT indicated that this section of Loop 1 ranked comparatively high in the Austin region for HOV lane consideration.

In addition, an Austin Mayor's Task Force convened in 2002 indicated that consideration of concurrent flow dedicated lanes (one in each direction) along this corridor be studied in further

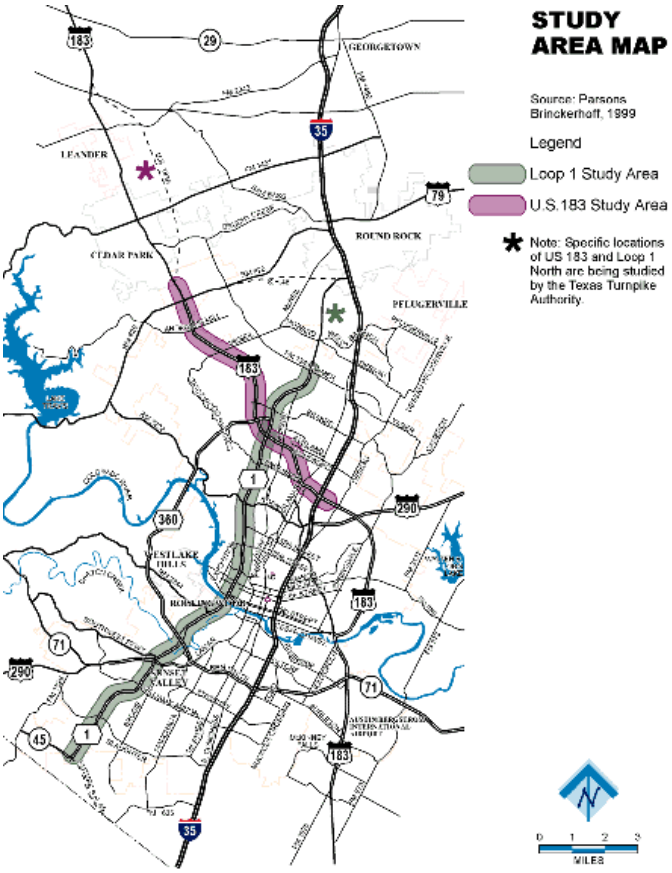
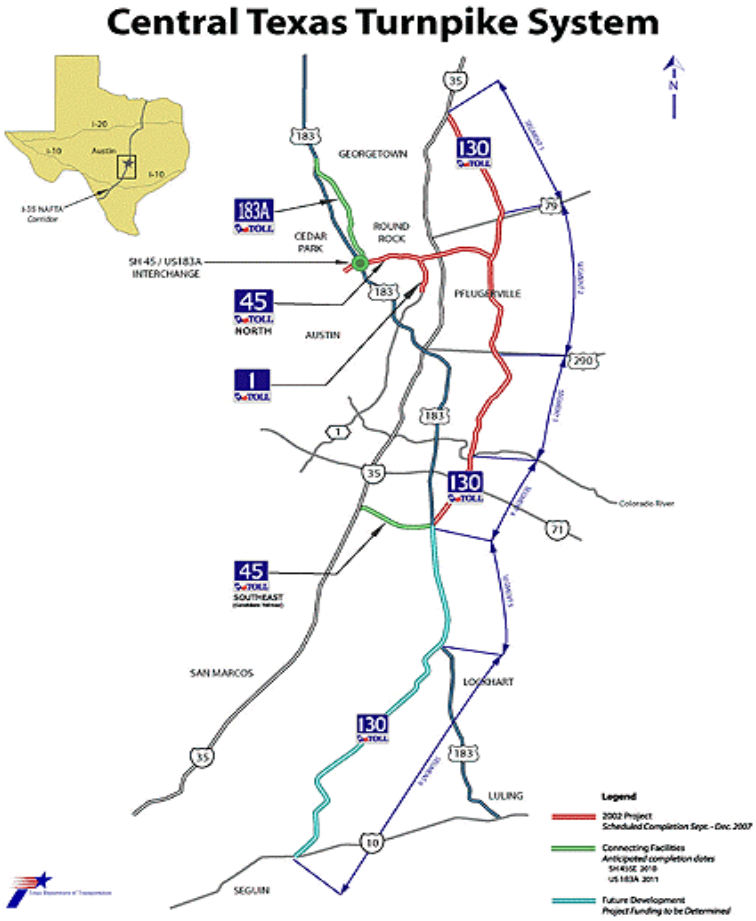


Figure 1. Loop 1/US 183 Corridors

long range planning efforts by TxDOT. In January, 2005, the Capital Area Metropolitan Planning Organization (CAMPO) adopted a "managed lanes" designation for the Loop 1 Corridor from 1st/5th Streets (downtown) north to Parmer Lane with the intent of proceeding with a near-term implementation project to provide travel options and enhance bus service in the corridor. From Parmer Lane to the north, Loop 1 is being constructed as a new toll facility as part of the Central Texas Turnpike System.



As a result of the direction of the MPO and the community support developed thus far for the concept, TxDOT is in the preliminary design stage of a reconstruction project that involves widening the existing cross section to create one HOT lane in each direction. The overall goals for the HOT lanes are as follows:

- Provide an incentive to encourage transit and vanpool use by employing variable pricing to maintain free-flow speeds;
- Generate revenue to help fund the project and related mitigation treatments; and

- Promote a high level of mobility in a corridor that will continue to be congested.

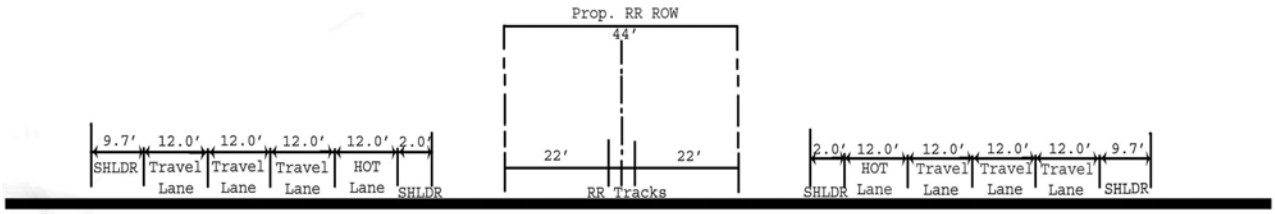
The purpose of the HOT lanes are to provide a bus and vanpool alternative to recurring congestion along Loop 1, thereby providing a means of regaining mobility in this corridor until more permanent, longer term capacity improvements can be implemented. Feasibility studies currently underway will define the specific project scope, design and operational features. The concept of an added lane is illustrated in Figure 1.

Figure 1: HOV/HOT Concept for Added Concurrent-flow HOV Lane

Loop 1 HOT Lanes - Project Description

Officially called the Loop 1 Reconstruction Project, the limits for concurrent flow HOT lanes extend from 1st/5th Streets (downtown) to Parmer Lane. The lane will operate with the flow of traffic, and be distinguished from adjacent lanes by a wide solid pavement marking or shallow buffer area. Physical separation has not been completely ruled out, but if separation is applied, it will be permanently placed pylons or traffic channelizers located in the buffer area.

The design cross section will include full lane widths for all lanes within the cross section, with limited shoulder widths (see figure below showing preliminary section).



Widening is assumed into the UPRR right-of-way, but preservation of a two-track envelope will be maintained. Widening in some places may occur to the outside, but no new right-of-way acquisition is anticipated.

Intermediate access will be designated at up to four locations. Intermediate access locations will be determined to best meet Capital Metro bus transit needs and serve high volume movements to/from downtown, the University of Texas area, RM 2222 and US 183. Access will require weaving across general traffic lanes. Accordingly, access openings will be located some distance from downstream ramps. CORSIM modeling will confirm precise lane transitions and intermediate access locations.

The intended operation is 24-hour with exempt registered vanpools and buses. Due to cross-section constraints and inability to provide visual enforcement areas, it is not envisioned that carpools will be provided free passage. All users will be equipped with a transponder for identification and electronic toll collection (ETC). The pricing approach likely to be adopted will be dynamic pricing that is responsive to the level of service being experienced in the HOT lane. Monitors will detect traffic flow rates and adjust pricing according to a prescribed plan that assures flow rates are sustained. Up to four toll zones are anticipated with intermediate ingress/egress. It is anticipated that tolls will also vary by segment, with segments experiencing highest demand charged more than others.

HOT lane operations will commence after the Loop 1 toll facility to the north is completed and operational, probably no earlier than 2009. The Loop 1 toll facility will be ETC equipped and is currently envisioned to have a flat toll rate for each segment. As the TxDOT nears completion of the Loop 1 toll facility, an innovative tolling approach using low-cost "sticker tags" and unique tag distribution methods will be put into place. The Loop 1 HOT lanes will utilize the same technology and back-office operations as the new toll facilities in the region, and its implementation will closely follow the opening of the region's new toll roads.

The specific goals of this Pre-Project Study are the following:

1. To develop an enforcement strategy for the Loop 1 HOT lanes to minimize toll evasion, given the cross section limitations and proposed striped lane separation.
2. To develop an operations strategy that integrates dynamic pricing, ITS infrastructure, signing/driver communication, enforcement, and toll operations, given the design constraints of the facility.

Both of these strategies will be incorporated into the implementation of the Loop 1 HOT lanes.

3. **Social and Economic Effects**

The extent of equity issues related to project implementation are unknown at this time, but equity concerns can potentially be mitigated by providing enhanced express bus service in the corridor.

4. **Role of Alternative Transportation Modes**

Transit service is an important component of the project, and buses and vanpools will be the primary beneficiaries of the new HOT lanes. Capital Metro currently operates some express buses to downtown via UT from park & ride lots located out US 183; however, the buses do not have any preferential treatment over mixed flow traffic that would provide a travel time advantage. The design of the HOT lanes will improve the attractiveness of bus service in the corridor and future routes for park & ride services located further out Loop 1 and US 183.

Previous corridor studies, the current transit authority plans, and the Capital Area Long-Range Transportation plan all recommend an HOV and/or transit preference in this corridor. Additionally, the transit authority has expressed a willingness and desire to alter express bus routes to take advantage of a free-flowing priority transit lane in the corridor.

5. **Timeline**

Pre-Project Study: October 1, 2005 – September 30, 2006

Implementation: It will be critical to complete the pre-project study before the project moves into the design phase in fall, 2006. The table below illustrates the timeline for the project. The strategies developed through this pre-project study will be directly implemented in coordination with the addition of HOT lanes to Loop 1, which will open in 2008 (estimated).

Project Development Phase	Estimated Timeframe
Feasibility study	Complete Summer 2005
Schematic development and environmental assessment	Complete Summer 2006
Design	Begin Fall 2006
Construction	Begin Early 2007
Opening	2008

6. **Detailed Project Tasks**

Task 1. Data Collection **Estimate Cost: $65,000**

Conduct pre-project data collection as needed to supplement data previously collected, including AADT, 24-hour traffic patterns, trip characteristics, toll feasibility analysis forecasts, managed lane access locations, social and economic impacts as mentioned above, congestion and delay. The study team will collect information related to TxDOT toll operations for the Central Texas Turnpike System, including violation enforcement system, communications infrastructure, prosecution of violations, and law enforcement support. The ITS capabilities and infrastructure for Loop 1 will also be documented. In addition, data and video footage from other projects, particularly I-394 in Minneapolis, will be used as available to assess optimum spacing of enforcement cameras for a stripe-separated HOT lane and identify best practices for compliance.

Task 2. Develop Enforcement Strategy **Estimated Cost: $75,000**

Enforcement will focus primarily on toll evasions through cameras located at each toll collection location, and augmented with intermediate cameras and on-site police practices. Occupancy enforcement should not represent a major compliance issue since carpools will not be given free use.

Using the data collected in the previous task, a comprehensive enforcement strategy will be developed to address supporting technology, field violation procedures (within the constrained cross section), law enforcement coverage, legal authority, and adjudication support in order to maximize HOT lane compliance. Safety considerations associated with the design and enforcement operations will also be examined. Among the items addressed in the strategy will be identification of optimum locations for camera spacing, and a comparison of costs, compliance expectations, and prosecution considerations for implementing VES (video enforcement system) cameras at all optimum camera locations, versus a combination of VES and “mock”cameras.

The results of this task may reveal a need for more discrete delineation between the HOT lanes and non-toll lanes through channelizers in order to achieve a reasonable compliance rate. As such, adjustments to the cross-section elements, namely lane widths and buffer widths, may be warranted.

Task 3. Develop Coordinated Operations Strategy **Estimated Cost: $75,000**

As is the case in most situations where right-of-way is constrained and pavement is limited, operational strategies that maximize efficiency become extremely important under less-than-desirable design conditions. Incident management, driver information/communication, and enforcement procedures can offer added efficiency and improve the flow of traffic. In a HOT lane situation, the continual monitoring of traffic conditions through ITS technology and the adjustment of

price according to those conditions poses an additional operational element in the project.

This task will involve the development of a comprehensive, coordinated operations strategy, a "concept of operations," for the Loop 1 HOT lanes. Among the items addressed in the plan will be the following:

- Technology implementation – coordinated deployment of ITS infrastructure for traffic monitoring, toll collection technology, and enforcement support technology
- Dynamic pricing operations – coordinated deployment of variable pricing algorithms, ITS infrastructure for traffic monitoring, and driver information/communication
- Field operations – coordinated deployment of incident management strategies, enforcement operations, and ITS infrastructure for traffic monitoring and communications.
- Back office operations – coordinated deployment of customer services operations and public outreach/education/marketing.
- Integration of transit and vanpooling operations – the primary objective of the project is to create an incentive for ridesharing in the corridor through bus transit and vanpooling. Incorporation of transit system elements such as bus routing, headways, terminal operations, and vanpooling program procedures will be important pieces of the comprehensive operations strategy.

7. **Evaluation**

The implementation plan developed through this pre-project study will identify the benefits and drawbacks of alternate enforcement and operational approaches. As part of the implementation plan, an evaluation framework will be formulated in order to assess the ultimate operational success of the project. The evaluation framework will identify the objectives of the implementation project, corresponding measures of effectiveness (such as violation rates, variations in speed and travel time) and the data collection needs to support the evaluation.

8. **Financial Plan**

A financial plan will not be developed as part of this study, but under separate contract for planning and engineering of the proposed HOT lane project.

9. **Plans for Involving Key Affected Parties**

The Texas Department of Transportation – Austin District will be the lead agency for the value pricing study. The feasibility study process included a variety of agency partners. These partnerships will also be utilized in this study and those

agencies will participate in the project. Partners include the following organizations:

- Capital Area Metropolitan Planning Organization (CAMPO)
- Capital Metro Transit Authority (Capital Metro)
- Central Texas Regional Mobility Authority (CTRMA)

Discussions are already underway with key stakeholders and representatives of adjacent neighborhoods. Right-of-way takings and highway noise have been the primary issues for the neighborhoods. The Loop 1 HOT lanes will be developed without additional right-of-way, satisfying one of the concerns, but the noise issues remain. As a result, TxDOT is considering noise walls for most sections between 1st/5th Streets and RM 2222. Various mitigation strategies will be assessed in the environmental review phase of this project to address current and proposed impacts. These will include

- Noise mitigation, including potential to place noise walls next to sensitive receptors in accordance with TxDOT's policy within TxDOT's right-of-way.
- Innovative pavement designs intended to improve noise absorption
- Aesthetic treatments as determined by public involvement

10. **Legal and Administrative Authority to Carry Out Project**

The Texas Legislature passed SB 370 during the 75th Legislative session that gave legal authority for TxDOT, toll authorities, transit agencies, and the private sector to participate in congestion pricing. TxDOT also had the authority, under section 224.154(a) of the Texas Transportation Code, to charge a toll on a facility with FHWA's approval.